

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A wheel comprising: a disc portion; and a rim portion substantially contiguous with said disc portion wherein said wheel is of substantially unitary steel construction, said wheel further comprising inner and outer bead-seat portions, said portions being substantially contiguous with said rim portion.
2. (Original) The wheel of claim 1, further comprising a flange portion which is substantially contiguous with said rim portion.
3. (Currently Amended) The wheel of claim 1, further comprising a well portion, which is substantially contiguous with, said rim portion.
4. (Cancelled) ~~The wheel of claim 1, further comprising a bead-seat portion, which is substantially contiguous with, said rim portion.~~
5. (Currently Amended) The wheel of claim 4 1, wherein said bead-seat has about a 5° or 15° taper.
6. (Original) The wheel of claim 5, wherein said wheel has a 5° or 15° drop center rim.

7. (Currently Amended) The wheel of claim 1, further comprising an inner and outer flange portion portions and an outer rim portion, wherein said inner and outer flange portions are substantially contiguous with said rim portion.

8. (Original) The wheel of claim 1, further comprising an inner flange portion and an outer flange portion, wherein said inner and outer flange portions are substantially contiguous with said rim portion and are positioned approximately at opposing ends of said rim portion; a well portion substantially contiguous with said rim portion; an inner bead seat portion substantially contiguous with said rim portion; and an outer bead seat portion substantially contiguous with said rim portion, wherein said inner bead seat portion is approximately positioned between said inner flange portion and said well portion, and wherein said outer bead seat portion is approximately positioned between said outer flange portion and said well portion.

9. (Original) The steel wheel of claim 1, wherein said disc portion has a center opening therethrough.

10. (Original) The wheel of claim 1, wherein said disc portion has at least one mounting opening the therethrough.

11. (Original) The wheel of claim 1, wherein said disc portion has at least one vent opening therethrough.

12. (Original) The wheel of claim 1, wherein said disc portion has at least one valve opening therethrough.

13. (Original) The wheel of claim 1, substantially mounted to a vehicle.

14. (Original) The wheel of claim 1, further comprising a tire substantially mounted to said wheel.

15. (Currently Amended) A method of manufacturing a wheel comprising the steps of:

forming a disc portion with a spinning machine; and

forming a rim portion with a spinning machine wherein said rim portion is substantially contiguous with said disc portion and wherein said wheel is of substantially unitary steel construction; and

forming inner and outer bead-seat portions, wherein said bead-seat portions are substantially contiguous with said rim portion.

16. (Original) The method of claim 15, wherein said wheel is formed from steel stock of substantially uniform thickness.

17. (Original) The method of claim 15, further comprising the step of forming a flange portion, wherein said flange portion is substantially contiguous with said rim portion.

18. (Original) The method of claim 15, further comprising the step of forming a well portion, wherein said well portion is substantially contiguous with said rim portion.

19. (Original) The method of claim 15, further comprising the step of forming an inner flange portion and an outer flange portion, wherein said flange portions are substantially contiguous with said rim portion.

20. (Cancelled) ~~The method of claim 15, further comprising the step of forming a bead-seat portion, wherein said bead-seat portion is substantially contiguous with said rim portion.~~

21. (Currently Amended) The method of claim ~~20~~ 15, wherein said bead-seat is formed with about a 5° or 15° taper.

22. (Original) The method of claim 21, wherein said wheel is formed with a drop center rim.

23. (Original) The method of claim 15, further comprising the step of forming a center opening in said disc portion.

24. (Original) The method of claim 15, further comprising the step of forming at least one mounting opening in said disc portion.

25. (Original) The method of claim 15, further comprising the step of forming at least one vent opening in said disc portion.

26. (Original) The method of claim 15, further comprising the step of forming at least one valve opening in said disc portion.

27. (Cancelled) ~~The method of claim 15, wherein said forming steps comprise at least one of spinning and/or flow forming processes.~~

28. (Cancelled) ~~The method of claim 15, wherein said method utilizes a spinning machine.~~

29. (Original) A wheel of unitary steel construction produced in accordance with the method of claim 15.

30. (Currently Amended) A method of manufacturing a one-piece wheel of 5° and 15° drop center rim of the type having a well, inner and outer bead-seat seats and flanges wherein the said method comprises the following steps:

a. Providing a generally circular steel blank having a;

~~b. The blank is preferably of pre-determined uniform thickness;~~

~~c. The blank is preferably with and a center hole pierced to a predetermined size;~~

~~d. The b. preforming the blank is preformed in a CNC spinning machine to a predetermined cylindrical shape & and size by spinning & and flow forming in a CNC spinning machine the blank, the blank being positioned & and clamped between a an inner mandrel and a clamping plate, such inner mandrel having a outboard surface which conforms to ~~an~~ a~~

predetermined inner diameter of the rim wherein the well, inner & outer bead seats and the outer flange are formed in the subsequent operations;

~~e. The c. further spinning in a CNC spinning machine the spun and flow formed preform to an predetermined cylindrical shape & size is further spun in a CNC spinning machine to reduce thickness and consequently to increase the width in the forward direction to an a predetermined size while maintaining the predetermined inner diameter wherein the well, inner & outer bead seats and the outer flange are formed in the subsequent operations and at the same time~~

d. further spinning is the preformed preform on the peripheral portion of the cylinder to displace the material ~~in the backward direction~~ to form an inner flange having a predetermined shape & and size of the inner flange; and

~~f. The perform e. further spinning the preform from the previous step, is further spun in a~~ CNC spinning machine to impart final shape and profile to the rim portion comprising of well, inner & and outer bead seats and inner & and outer flanges using such inner mandrel, the central line axis of which is slightly offset against the centerline of the central hole of the ~~perform~~ preform during spinning operation.

31. (Currently Amended) The method as claimed in claim 30 wherein spin forming the peripheral of the blank by engaging the ~~same blank~~ with a forming roller so as to obtain controlled thickness reduction and shape in the peripheral and inner portion of the blank.

32. (Currently Amended) The method as claimed in claim 30 further comprising the step of

~~wherein the material is displaced in the backward direction during spinning a peripheral~~
~~cylindrical~~ portion of the ~~perform preform peripheral cylindrical portion~~ against the ~~an~~ outboard surface of an outwardly positioned with respect to the axis of revolution of the blank outer roll to form a predetermined cylindrical portion of the inner flange.

33. (Currently Amended) The method as claimed in claim 30 wherein spin forming a portion of the blank peripheral portion by engaging the ~~same~~ blank with a forming roller to form the final shape of the well.

34. (Currently Amended) The method as claimed in claim 30 wherein spin forming a portion of the blank peripheral portion by engaging the ~~same~~ blank with a forming roller to form the final shape of the bead seat.

35. (Currently Amended) The method as claimed in claim 30 wherein spin forming the bead seat portion of the ~~perform preform~~ blank by engaging the ~~same~~ blank with a forming roller against the outboard surface of the outer mandrel to form the final shape of outer flange.

36. (Currently Amended) The method as claimed in claim 30, wherein: ~~said first named spin forming step~~ the step of spinning and flow forming the blank ~~consists~~ comprises a plurality of passes of the forming roller.

37. (Currently Amended) The method as claimed in claim 30 wherein after ~~finish~~ completion of the spinning operation bolt holes are pierced in said one piece wheel using a ~~conventional~~ press.

38. (Currently Amended) The method as claimed in claim 30 wherein after completion of the spinning operation ~~piercing the center hole~~, a plurality of bolt holes, and a plurality of vent holes are pierced in said one piece wheel using a ~~conventional~~ press.

39. (Currently Amended) The method as claimed in claim 30 wherein after piercing the center, bolt holes & vent holes, the center hole and the mounting holes are ~~accurately~~ machined to required size.

40. (Currently Amended) The method as claimed in claim 30 wherein after machining the center hole and the mounting holes to ~~an accurate~~ a required size, the inner & and outer flange crown edges are machined to provide a radius or a flat.

41. (Original) The method as claimed in claim 30 wherein said step (a) consists the step of providing a disc blank of substantially uniform thickness of low carbon steel or HSLA steel composition.

42. (Cancelled) ~~The method as claimed in claim 30 wherein a butt welded hoop of predetermined diameter, width and thickness can also be used instead of a blank.~~

43. (Cancelled) ~~The method as claimed in 39 wherein the butt welded hoop of predetermined diameter, width and thickness can also be used to manufacture the rim part alone.~~

44. (Cancelled) ~~The method as claimed in 39 wherein the butt welded hoop of predetermined diameter, width and thickness can also be used to manufacture of the rim part alone.~~

45. (Currently Amended) Apparatus for manufacturing a one-piece wheel of 5° and 15° drop center rim of the type having an integral disc and rim portion well, inner & outer & inner bead-seat and fixed flanges, wherein the said method comprises

means for providing a generally circular blank,

means for forming the blank to of a pre-determined uniform thickness, the blank is preferably with having a center hole pierced to a predetermined size,

means for spinning the blank to form a preform, ~~is pre-formed in a spinning machine,~~ the means comprising a ~~pre-form blank further spun in a spinning machine,~~ being positioned ~~between an~~ mandrel and clamping plate, such mandrel having a outboard surface which conforms to the shape of the well, inner & outer bead seat & fixed flanges, wherein the blank peripheral & inner portions is are spun and flow formed against the outboard surface of the inner mandrel and shaping rolls to form the final shapes of the rim ~~comprising of well, bead seat and flanges.~~

46. (Currently Amended) An apparatus ~~Apparatus~~ for manufacturing a one-piece wheel of 5° and 15° drop center rim for a vehicle having an integral disc and rim portion comprising of well, bead seats and flanges manufactured by the process claimed in claim 30.

47. (Cancelled) ~~A one piece wheel of 5° and 15° drop center rim for a vehicle having an~~

~~integral disc and rim portion as claimed in claim 30 comprising of well, bead seat and flanges wherein when spin forming machine is programmed to form different shapes.~~

48. (Cancelled) ~~A method of manufacturing a one piece wheel of 5° and 15° drop center rim for a vehicle having an integral disc and rim portion as claimed in claim 30 comprising of well, bead seat and flanges as described in the description of complete specification and as illustrated by way of drawings accompanying the complete specification.~~

49. (Cancelled) ~~A one piece wheel of 5° and 15° drop center rim for a vehicle having an integral disc and rim portion as claimed in claim 1 comprising of well, inner and outer bead seats and inner and outer flanges as described in the description of complete specification and as illustrated by way of drawings accompanying the complete specification.~~

50. (Cancelled) ~~A one piece wheel of 5° and 15° drop center rim for a family of vehicle wheels having any plurality of axial width, diameter and offset having an integral disc and rim portion as claimed in claim 30 comprising of well, inner and outer bead seats and inner and outer flanges as described in the description of complete specification and as illustrated by way of drawings accompanying the complete specification, may be produced from the blanks.~~

51. (Currently Amended) An apparatus for manufacturing from a steel blank a steel wheel of substantially unitary construction comprising a disc portion and a rim portion, said apparatus comprising:

a. a frame;

b. a rotating component which is substantially rotatably affixed to said frame and which rotates said blank;

c. a clamping component which maintains said steel blank in a substantially fixed position relative to said rotating component; and

d. a forming component, wherein said forming component substantially forms said disc and rim portions into said steel wheel of unitary construction from said steel blank said wheel comprising an inner and an outer bead seat formed on said rim portion.

52. (Original) The apparatus of claim 51, wherein, said forming component forms a well into said rim portion of said unitary wheel.

53. (Cancelled) ~~The apparatus of claim 51, wherein, said forming component forms one or more bead seats into said rim portion of said unitary wheel.~~

54. (Cancelled) ~~The apparatus of claim 51, wherein, said forming component forms an inner bead seat and an outer bead seat into said rim portion of said unitary wheel.~~

55. (Currently Amended) The apparatus of claim 51, wherein, ~~said forming component forms an inner bead seat and an outer bead seat into said rim portion of said unitary wheel, and wherein~~ said inner and outer bead seats have approximately a 5° or 15° angle.

56. (Original) The apparatus of claim 51, wherein, said forming component forms one or more flanges into said rim portion of said unitary wheel.

57. (Original) The apparatus of claim 51, wherein, said forming component forms inner and outer flanges into said rim portion of said unitary wheel.

58. (Original) The apparatus of claim 51, wherein, said forming component forms a unitary wheel having approximately a 5° or 15° drop center rim.